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ABSTRACT

The ability of language impaired children to remember and retell two stories within their lexical and syntactic grasp was investigated with 12 language handicapped and 12 normal children (7 to 9 years old). An audiotape of the child's retelling of the stories was analyzed in terms of accurate recall, plausible information added during recall, errors in recall, the organization of recall, and the ordering of story information. Results indicated that the language impaired children exhibited recall deficits in the amount of information recalled when compared to the normal children. They did not differ from normal children in the amount of plausible information added, the number of errors in recall, the organization of their recall, or in the accurate ordering of story information. An additional test of their ability to process single sentences showed that the language impaired children had poorer short term recall than normal children 2 years younger. A sample story, statistical data, and graphs are appended. (DB)

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**Memory for Stories in Language-Impaired Children**

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## Memory for Stories in Language-Impaired Children

Children with specific language impairments are generally described as children who exhibit significant difficulties acquiring and using language, which cannot be explained by inadequacies in sensory, intellectual, or psychosocial functioning. Memory deficits in such language-impaired children, though long recognized, have been studied almost entirely in short-term memory tasks requiring verbatim recall.

Using such short-term memory tasks, language-impaired children have repeatedly been shown to have memory deficits in the auditory modality (see, for example, Tallal & Piercy, 1973). However, verbatim recall is required relatively infrequently in daily situations. More often, the child is confronted with connected meaningful material, that is, with discourse, such as a conversation or a story. The memory task in this case is usually closer to "memory for the gist" or, in other words, memory for content, rather than form. Therefore, the goal of the present study was to explore the issue of gist recall in language-impaired children.

Gist recall differs from verbatim recall in several ways. In verbatim recall, a "copy" is made of the input which is then recalled intact. However, in gist recall, the listener appears to construct a representation of the meaning of the input, while syntactic form is quickly lost (Sachs, 1967). Information from separate input sentences is combined in this memory representation (Bransford & Franks, 1971); and inferences about the input may also be included (Bransford, Barclay & Franks, 1972). At recall, the information in the memory representation is "reconstructed" into a new surface form.

Memory for content, or gist recall, has been studied in normal

children primarily in the context of story recall (see, for example, the work of Mandler & Johnson, 1977, and Stein & Glenn, 1979). The general findings can be summarized as follows: First, the amount of information recalled increases consistently with age, ranging from five year olds to adults. Further, not all parts of the story are equally well recalled. This has been studied using various story grammars devised to capture the hierarchical structure of stories in terms of their plot elements. Figure 1 in the handout shows the underlying structure of a one-episode story according to Mandler and Johnson's (1977) story grammar. At the bottom of the figure, the basic plot elements, or story nodes, are listed and defined. Using Mandler and Johnson's terminology, elementary age children have been found to focus their recall on Settings, Beginnings, and Outcomes, while exhibiting poor recall of the protagonist's internal Reactions and Goals.

The study of story recall has also shown that children add information during recall that was not present originally. And finally, children generally also exhibit extremely accurate ordering of story information in their recall.

Story recall has not been studied in children specifically identified as language-impaired. The present study was designed to address this need. Three questions were asked:

1. Do language-impaired children exhibit deficits in "memory for the gist" of material which contains sentences within their lexical and syntactic grasp?
2. Does their focus of recall, in terms of story grammar categories, differ from that of normal children; that is, do they organize their recall any differently?

and finally,

3. Do they have difficulty recalling story information in the proper order?

## METHOD

Subjects

Two groups of children, one normal and one language-impaired, served as subjects. There were 12 children in each group. All were monolingual and came from an upper middle class suburban school system. In addition, all had normal hearing and demonstrated average nonverbal intelligence. The children in both groups ranged in age from 7 to 9 and were matched on age and sex.

The language-impaired children were diagnosed as exhibiting moderate specific language difficulties, not due to other disabilities. According to standardized testing, each child was also performing one or more years below age level in at least two of the following areas: receptive vocabulary, receptive syntax, verbal reasoning, expressive syntax, and immediate auditory memory for sentences. All were receiving language therapy in the school setting.

The normal children were performing satisfactorily in school. They were reading at their appropriate grade level, and they exhibited age level immediate memory skills for sentences.

Materials

Two practice stories and two test stories were devised for this study. These were adapted from several of Aesop's fables and structured according to the Mandler and Johnson story grammar mentioned earlier. Page 2 of your handout shows one of the practice stories parsed into the various story nodes. Practice stories were one episode in length, while test stories consisted of two episodes. In addition, the stories were written to be as simple as possible. Lexical items were all found in the speaking vocabularies of kindergarten children, according to norms established by Murphy (1957).

Mostly simple sentences were used with very few embeddings. And individual sentences were kept as short as possible, with none exceeding 9 words in length.

#### Procedure

Each child was seen individually. Several pretests were conducted prior to the story recall task. Screening showed that no child in the language-impaired group scored below the 6 year level on the Peabody Picture Vocabulary Test (Dunn, 1965). In addition, every child was pretested to make sure he could understand the syntactic structures used in the stories. Each child was also tested to see if he could repeat the longest sentences in the stories. This insured that individual sentences were within the short-term memory limitations of the impaired subjects. In other words, care was taken to make sure that the language-impaired children could process the stories linguistically at the sentential level.

The story recall task followed the pretesting. First, the child was given the two practice stories as a warm-up. These were followed by the two test stories, randomly ordered for each child. For both the practice and test stories, the child was told that he was going to hear a story and that later he would be asked to recall it. The experimenter read the stories to the child. Immediately after each one, the child was asked to retell the story remembering as much as he could. The child's recall was audiotaped and later transcribed.

For purposes of scoring, the input stories and the recall protocols were analyzed into propositions. A proposition was defined as a verbal element plus its arguments where a verbal element could be a verb, adjective, preposition, or adverb. For example, in this

system, "the boy eats the big cookie" contains two propositions-- first, "the boy eats the cookie" and second, "the cookie is big". For the sake of simplicity, certain aspects of meaning were not included in this analysis, including those represented by verb tense and other temporal markers, auxiliary verbs, determiners, quantifiers, adverb or adjective modifiers, and plurality.

The data were analyzed in three ways. First, each proposition in the child's protocol was compared to the input stories and classified into one of seven categories. These will be referred to as measures of "relative accuracy" and may best be thought of as consisting of three major groupings: accurate recall, plausible information added during recall, and errors in recall. These are listed and defined in Table 1 of your handout.

The first three measures involve cases of basically accurate recall, that is, the SAME, EQUIVALENT, and REDUNDANT categories.

1. SAME= the child's proposition was the same as the input proposition
2. EQUIVALENT= the child's proposition included an equivalent substitution, for example, "large" for "big"
3. REDUNDANT= the child's proposition retained the essential meaning of one or more input propositions, but the child expressed it in a somewhat different way; for example, the child recalled "I want to buy a present" for "I'm buying a present"

The next two measures involve plausible added information. These are the SUMMARY and ELABORATION categories.

4. SUMMARY= the child's proposition as a whole was a fairly close summary of several input propositions; essentially there was a condensation of information; for example, the input was "I know", said Mike. "I can ask my sister." and the child recalled "Mike had an idea."
5. ELABORATION= the child's proposition presented new information not given in the text, but which might have been implied or presupposed; for example, in one story, a character buys a present and later some children recalled that it was a birthday present

and finally, the last two measures, PARTIAL RECALL and FABRICATION, involve clear recall errors.

6. PARTIAL RECALL= the child's proposition included a nonequivalent substitution, such as recalling "Mike" for "John"

7. FABRICATION= the child's proposition was totally incorrect

A second rater rescored 30% of the recall protocols, and an inter-rater agreement of .97 was found.

Next, in order to assess the organization of recall, the data were then analyzed in terms of the various story nodes recalled. The accurate propositions (those scored as SAME, EQUIVALENT, or REDUNDANT) were reclassified in terms of the story nodes they represented, that is, whether they were Settings, Beginnings, Reactions, etc. The percentage of propositions recalled from each node was then calculated.

Finally, the data were analyzed for temporal ordering of story information. This was assessed by calculating the percentage of SAME or EQUIVALENT propositions recalled in the correct order.

The data from the "relative accuracy" measures, story node recall, and temporal ordering were examined statistically in a series of repeated measures analyses of variance. Acceptable significance levels were set at .05 or better.

#### RESULTS AND DISCUSSION

The results will be reported in terms of the three aspects of recall which were examined: the "relative accuracy" measures, the organization of recall, and the temporal ordering of story information.

Table 1 in the handout gives a breakdown of the number of propositions classified into each "relative accuracy" category. On the basis of the statistical analyses, it was found that the

groups differed primarily in the amount of accurate recall, that is, in the number of SAME, EQUIVALENT, and REDUNDANT propositions. The normal group simply recalled more information from the stories than the language-impaired group.

The groups did not differ significantly in the amount of plausible information added during recall nor in the number of errors in recall. It should be noted that errors, particularly fabrications, occurred at a very low rate in both groups. Further, propositions scored as PARTIAL RECALL were usually cases where an individual child failed to remember a character's name and substituted another name throughout his recall. In these cases, the child usually substituted a name that had occurred in previous stories. This difficulty in name recall occurred in a small number of children in both groups (2 in the normal group, 3 in the language-impaired group). Therefore, it does not appear to be associated with language disability per se. Rather, it may represent some natural variability in memory skills.

Differences between the two test stories were also observed for SAME, EQUIVALENT, REDUNDANT, and SUMMARY categories. Basically, one story was easier to recall than the other. This same story also generated more summary statements. However, there were no Group X Story interactions.

To further judge the effects of short-term memory limitations on gist recall, three language-impaired children were matched with three additional normal children on immediate recall of sentences. These normal children were approximately two years younger than the language-impaired children, but otherwise they met all the subject criteria described previously. Table 2 in the handout shows the

number of propositions classified into each "relative accuracy" category for each of these groups. Results similar to those found with the larger population were obtained. Again, the major finding was that the normal group clearly outperformed the language-impaired group, even when matched on short-term memory abilities for sentences.

The organization of recall was assessed in terms of the child's recall of the various story nodes. Basically, the two groups exhibited very similar patterns of recall. Overall, Settings, Beginnings, and Attempts were well recalled, Outcomes and Endings were moderately recalled, and Reactions and Goals were poorly recalled. Figure 2 in the handout shows the percentage of propositions recalled from each node overall and for each group separately. This is similar to previous findings by Mandler and Johnson (1977) and Stein and Glenn (1979) in that Settings and Beginnings were well recalled, and Reactions and Goals were poorly recalled. Unlike the earlier work, Attempts were also well recalled.

Despite this overall similarity between groups in recall organization, there was a trend for the two groups to treat one test story differently. For this story, the normal group exhibited relatively poor recall of Outcomes while the language-impaired group exhibited relatively good recall of Outcomes. Their treatment of the other story was quite similar. What these findings suggest is that in general, normal and language-impaired children appear to organize their recall in a similar manner, although on specific stories there may be some small differences.

Finally, on the temporal ordering of story information, the groups again performed similarly. Both groups were highly accurate

in recalling story events in the proper order. Initially, this may be surprising since language-impaired children are often described as having sequencing difficulties (see Poppen, Stark, Eisenson, Forrest & Wertheim, 1969). However, this term has usually been used to indicate difficulty in recalling a series of unrelated items in the correct order. This is clearly very different from the task here where the child was given structured meaningful material. Apparently, where meaningful structure is present, sequencing is not an issue with the population in this study.

In sum, the language-impaired children studied here did exhibit gist recall deficits on a story recall task using materials within their lexical and syntactic grasp. However, these deficits were observed primarily in the amount of information recalled. The language-impaired children simply recalled less from the stories than the normal children. In contrast, they did not differ from the normal children in the amount of plausible information added, the number of errors in recall, the organization of their recall, or in the accurate ordering of story information. However, a word of caution is advisable. These findings can only be considered in relation to children with moderate language impairments. More severely impaired children may very well exhibit greater deficits as well as a different profile of deficit.

What can account for these deficits? A few possibilities can be ruled out immediately. Memory breakdown was not due to difficulty in comprehending and processing individual sentences. This was insured by the controls on vocabulary, syntax, and sentence length. In addition, even when matched for their ability to process single sentences, these language-impaired children still exhibited poorer

recall than normal children.

However, many other possibilities remain as the source of deficit. I'd like to mention a few of these. First, it is possible that these children are experiencing processing difficulties which are more critical to discourse than to individual sentences. The speed of processing immediately comes to mind in this regard. In discourse processing, the information in each sentence must constantly be integrated with information from previous sentences. If processing is going too slowly, the child may not be finished with Sentence A before he is confronted with Sentence B. Rate limitations for speech processing have already been well documented by Tallal & Piercy (1973, 1974, 1975). Other types of rate limitations may also exist for higher level linguistic categories.

Assuming adequate discourse processing, a second possible area of deficit is a memory encoding difficulty. In this case, the child may fail to construct a complete, well-integrated memory representation of the input.

Thirdly, retrieval difficulties, which are not due to poor encoding, could also account for gist recall deficits. That is, the child may encode a great deal of information, but he is not able to gain access to it at recall.

Fourthly, it is possible that the language-impaired child has a less well-developed story schema despite the fact that the two groups behaved similarly in this study. Mandler (1978) has characterized "story schema" as the child's expectations about the plot elements of stories and how they are put together. A poorly developed story schema could affect encoding by preventing the child from storing the most appropriate information. And it could also

impair retrieval by not providing the child with an adequate plan for recall.

Finally, issues of metamemory may be contributing to the child's difficulty. Perhaps the language-impaired child fails to apply appropriate encoding and/or retrieval strategies because he does not recognize the need or efficacy of such strategies. In other words, the child is unable to assess the requirements of the memory task relative to his capabilities as a rememberer.

At the present time, none of these potential sources of deficit can be ruled out. Rather, it is entirely possible that all are contributing to a greater or lesser degree, depending on the individual child.

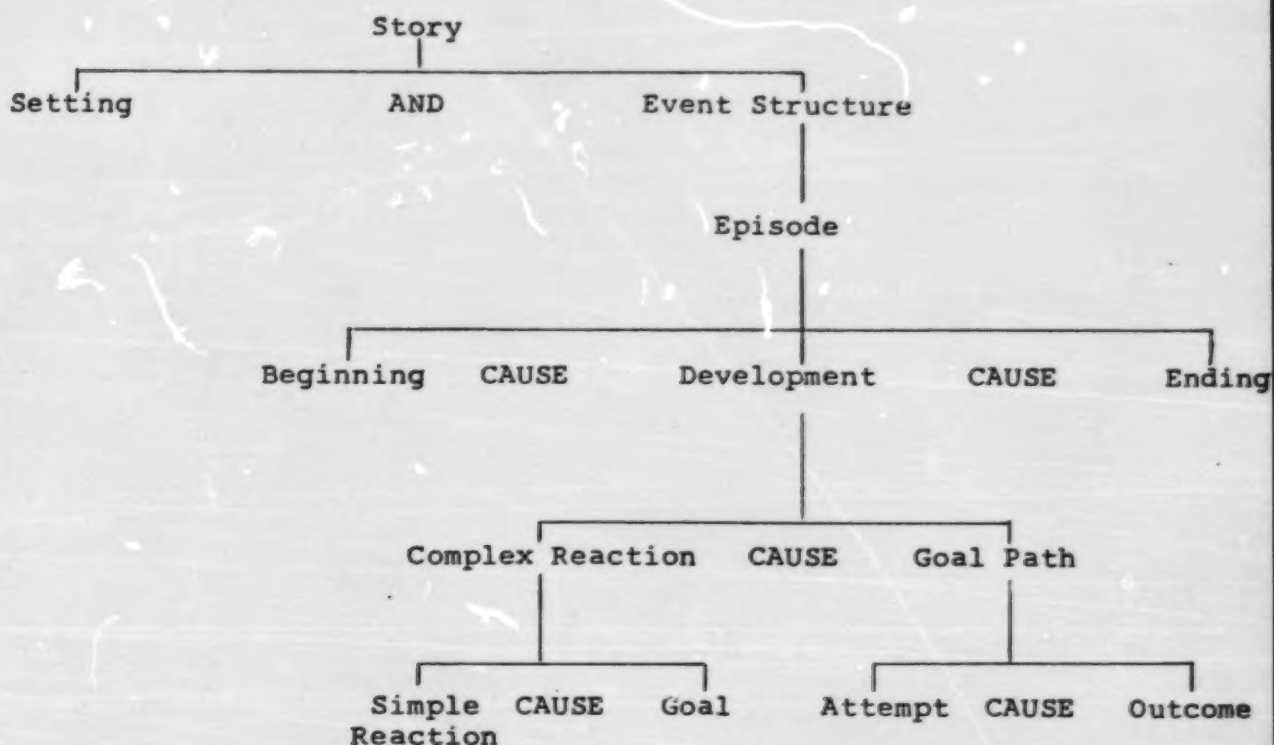
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Figure 1

Diagram of the basic nodes in a single episode story according to the Mandler & Johnson (1977) story grammar



Setting-- introduction of protagonist (P) and possibly time, locale, and other contextual information

Beginning-- event(s) which causes P to respond

Simple Reaction-- internal response of P to the beginning events

Goal-- goal set up by P

Attempt-- P's efforts to reach goal

Outcome-- immediate result of P's attempts to achieve goal

Ending-- close of the episode, relating to the development as a whole

Sample parsing of a one-episode story  
according to the Mandler & Johnson grammar

|                 |                                                                                     |
|-----------------|-------------------------------------------------------------------------------------|
| SETTING         | This story is about a little boy.<br>His name is Billy.                             |
| BEGINNING       | One day, Billy found an apple tree.<br>There were many apples on the tree.          |
| SIMPLE REACTION | Billy said, "I'm hungry."                                                           |
| GOAL            | "I want to pick a big apple."                                                       |
| ATTEMPT         | The apples were very high.<br>Billy jumped and jumped.<br>But Billy was very small. |
| OUTCOME         | He could not reach the apples.                                                      |
| ENDING          | Finally, Billy went home.<br>"I don't like apples, anyway," he said.                |

Table 1

3

No. of Propositions Classified into each "Relative Accuracy" Category collapsed across stories

|                               | Category |      |     |              |     |      |    |     |
|-------------------------------|----------|------|-----|--------------|-----|------|----|-----|
|                               | Total    | S/EQ | RED | S/EQ<br>+RED | SUM | ELAB | PR | FAB |
| Normal Group(n=12)            | 1007     | 600  | 130 | 730          | 99  | 111  | 61 | 6   |
| Language-Impaired Group(n=12) | 718      | 397  | 73  | 470          | 66  | 115  | 64 | 3   |

Accurate Recall { S=SAME, child's proposition is the same as the input proposition  
EQ=EQUIVALENT, child's proposition includes an equivalent substitution; for ex., "large" for "big"  
RED=REDUNDANT, proposition retains essential meaning, but child expresses it in a somewhat different way than in the input; for ex., the child recalls "I want to buy a present" for "I'm buying a present"

Plausible Info. Added { SUM=SUMMARY, child's proposition as a whole is a fairly close summary of several propositions given in the input, essentially a condensation of information; for ex., the input is ' "I know," said Mike. "I can ask my sister." ' and the child recalls "Mike had an idea."  
ELAB=ELABORATION, child's proposition presents new information not given in the text, but which might have been implied or presupposed; for ex., in one story, a character buys a present and later some children recalled that it was a birthday present

Errors in Recall { PR=PARTIAL RECALL, child's proposition includes a nonequivalent substitution, such as recalling "Mike" for "John"  
FAB=FABRICATION, child's proposition is totally incorrect

Table 2

No. of Propositions Classified into each "Relative Accuracy" Category Collapsed across Stories for Normal and Language-Impaired Groups Matched on STM<sup>a</sup>

|                              | Category |      |     |              |     |      |    |     |
|------------------------------|----------|------|-----|--------------|-----|------|----|-----|
|                              | Total    | S/EQ | RED | S/EQ<br>+RED | SUM | ELAB | PR | FAB |
| Normal Group(n=3)            | 257      | 152  | 30  | 182          | 32  | 23   | 20 | 0   |
| Language-Impaired Group(n=3) | 181      | 111  | 28  | 139          | 07  | 29   | 06 | 0   |

<sup>a</sup> using Memory for Sentences (Spencer, 1959)

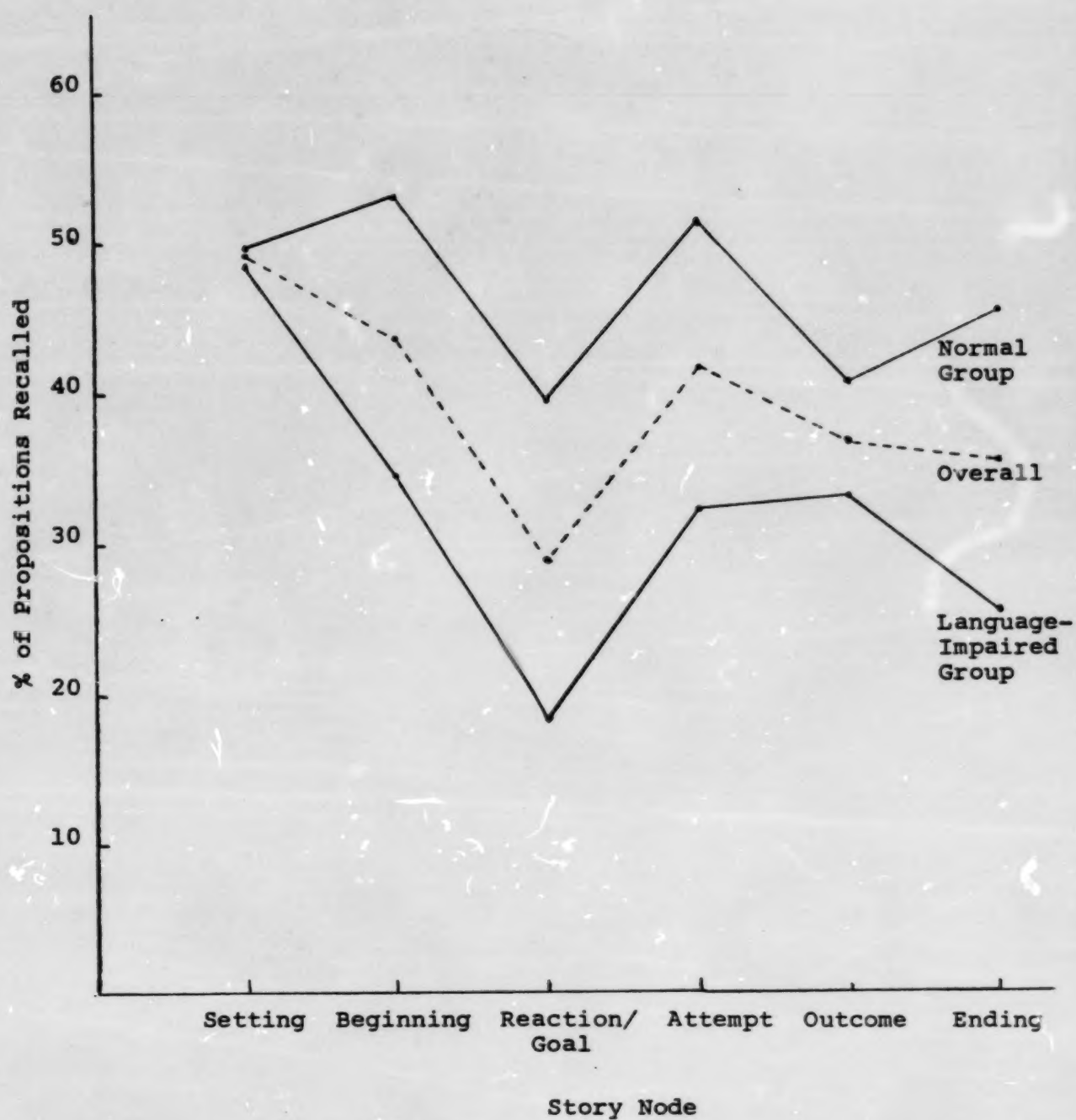


Figure 2. Percentage of propositions recalled from each node, overall and for each group separately